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7-1 Puzzle: Crossword

Ratios and Proportions

Solve each problem. Write your answer in the crossword puzzle below. Each numerical answer should be written in word form. (Don't forget hyphens where appropriate!)

1 S	I	X	2 T	Y	-	T	H	3 R	E	4 E
			H					E		X
5 R	A	T	I	O				C		T
			R			6 T		I		R
7 S	I	X	T	Y		W		P		E
			Y		8 F	O	U	R		M
			-					O		E
			N					C		S
		9 F	I	V	E			A		
			N					L		
	10 E	L	E	V	E	N		S		

Across

1. The ratio of two complementary angles is 3 to 7. Find the measure of the larger one.

5. A ? is a comparison of two quantities by division.

7. The measures of the angles of a triangle are in the ratio 1 : 3 : 5. How many degrees is the middle-sized angle?

8. Find the value of x: $\frac{6}{x+5} = \frac{2}{3}$

9. Find the value of y: $\frac{y}{6} = \frac{7.5}{9}$

10. If $\frac{a}{3} = \frac{c}{11}$, then $\frac{a+3}{3} = \frac{c+\ ?\ }{11}$.

Down

2. Mary is making a party mix to bring to school. She believes that the perfect ratio of pretzels to peanuts is 3 to 5. If Mary knows that she is going to use 65 peanuts in the mix, how many pretzels will she need?

3. $\frac{a}{b} = \frac{c}{d}$ is equivalent to $\frac{b}{a} = \frac{d}{c}$. In other words, if two fractions are in proportion, their ? are also in proportion.

4. The first and last numbers in a proportion are known as the ?.

6. Find the value of z: $\frac{4z-2}{3} = \frac{2z+6}{5}$

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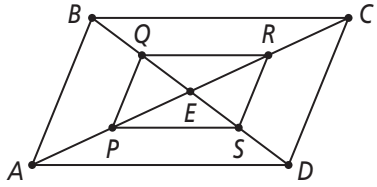
7-2 Activity: Similarity Investigation

Similar Polygons

Construct

Construct parallelogram $ABCD$ whose diagonals intersect at E. Measure its sides and angles. Construct the midpoints of $\overline{AE}$, $\overline{BE}$, $\overline{CE}$, and $\overline{DE}$ called P, Q, R, and S, respectively.

Construct a quadrilateral $PQRS$ and measure its sides and angles.



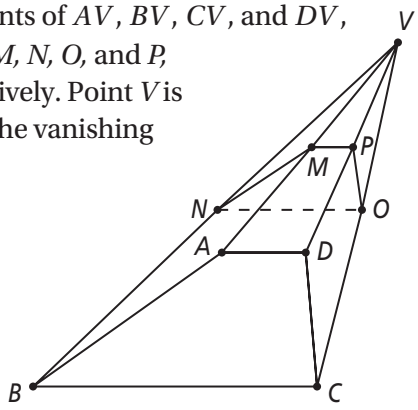
Investigate

1. Drag the vertices of $ABCD$ and observe the effect on $PQRS$. Classify $PQRS$ as specifically as possible. **parallelogram**
2. Explain why this classification holds. **The sides of *PQRS* are mid segments, and therefore parallel, to the sides of *ABCD*.**
3. Comparing corresponding angles and sides, verify that $ABCD$ and $PQRS$ are similar. **corresponding angles are congruent; corresponding sides are proportional**
4. Find the similarity ratio. Without measuring, make a conjecture about the ratio of the areas of the two figures. Test your conjecture by measuring. **2 : 1, 4 : 1**
5. Do you think the results in Exercises 1 through 4 are true for quadrilaterals that are not parallelograms? Test your answer by constructing and measuring. **yes**

Extend

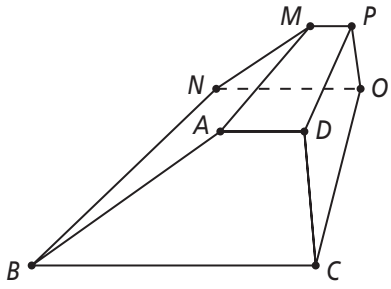
Step 1

Construct quadrilateral $ABCD$ with point V not on $ABCD$. Construct line segments from each vertex of $ABCD$ to V. Construct the midpoints of $\overline{AV}$, $\overline{BV}$, $\overline{CV}$, and $\overline{DV}$, called M, N, O, and P, respectively. Point V is called the vanishing point.



Step 2

Draw segments connecting the corresponding vertices of $ABCD$ to $MNOP$. Then hide the segments joining the vertices of $ABCD$ to V. The three dimensional object that results is an example of a drawing in one point perspective.



6. Measure the sides and angles of $ABCD$ and $MNOP$ and verify that the quadrilaterals are similar. **corresponding sides are in a ratio of 2 : 1; corresponding angles are congruent**

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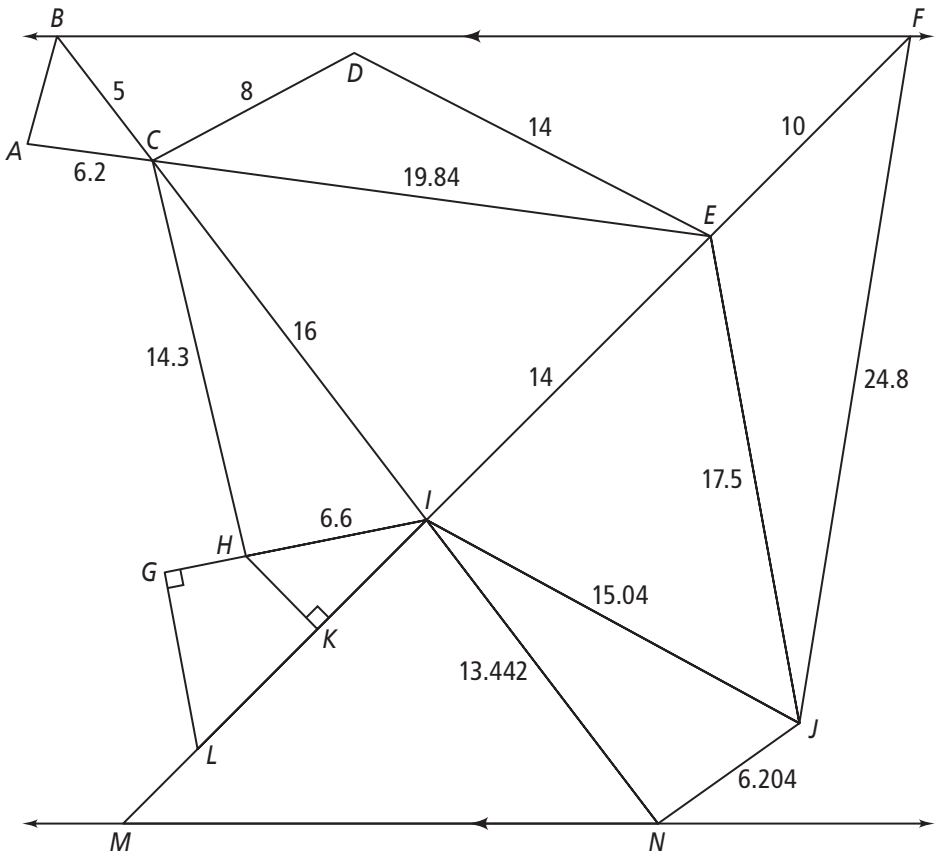
7-3 Puzzle: Similarity Search

Proving Triangles Similar

Search for similar triangles in the diagram below. Justify each similarity statement with a theorem.



1. $\triangle ABC \sim$ ___△EIC___ by ___SAS~___

2. $\triangle NIM \sim$ ___△BIF___ by ___AA~___

3. $\triangle CDE \sim$ ___△FEJ___ by ___SSS~___

4. $\triangle IKH \sim$ ___△IGL___ by ___AA~___

5. $\triangle CIE \sim$ ___△FIB___ by ___SAS~___

6. $\triangle CHI \sim$ ___△INJ___ by ___SSS~___

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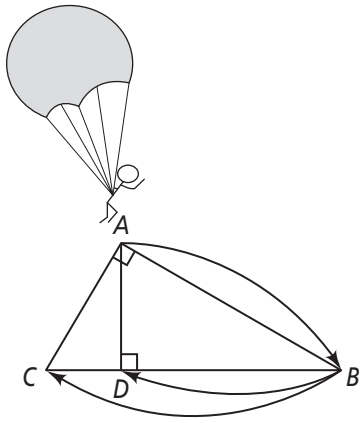
7-4 Activity: Exploring with Skydiver Skip

Similarity in Right Triangles

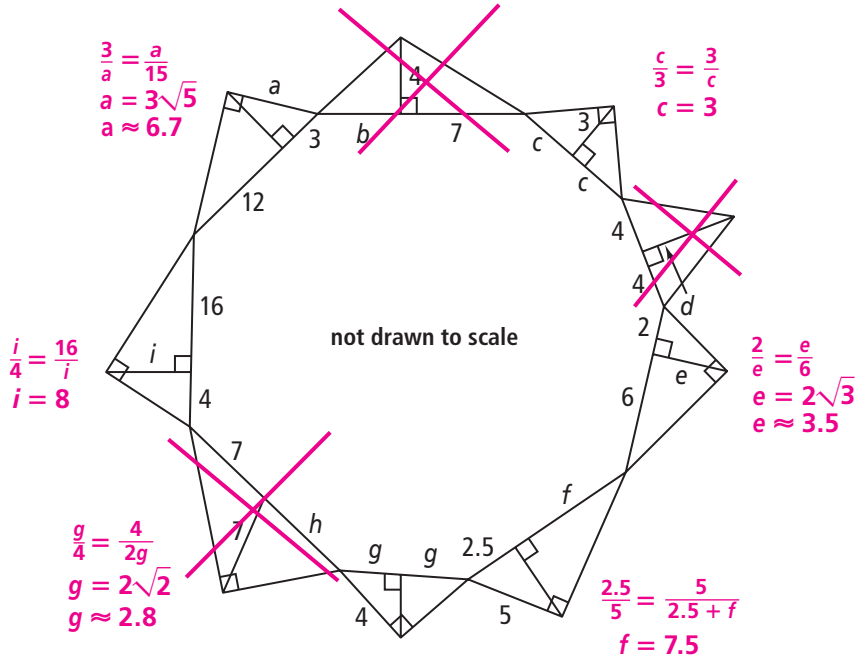
Skydiver Skip loves to apply the geometric mean. In fact, it's all he does. He always lands on the right angle of a right triangle whose altitude is drawn. He knows that if he does, each path down the mountain is a geometric mean between two segments along the hypotenuse.



For example, in the triangle at the right, Skip would land at A. AB, AD, and AC would function as geometric means in three different proportions. So, if he went down $\overline{AB}$, his options for trails would be $\overline{BD}$ or $\overline{BC}$. So, $\frac{AB}{BD} = \frac{BC}{AB}$. Setting up these proportions allows him to calculate trail lengths and plan his expeditions.

For his next adventure, Skydiver Skip needs your help. He plans to land on the beautiful planet Trianguland where triangular mountains surround the globe. He has a mapmaker's early draft with the correct measurements, but the map was not drawn to scale. Skip asks you to:

1. Put an "X" through any triangles that do not satisfy his initial conditions (they must be right triangles with an altitude drawn).
2. Based on the labeled information, set up a proportion, using a path down the mountain as a geometric mean.
3. Solve for the missing trail length.

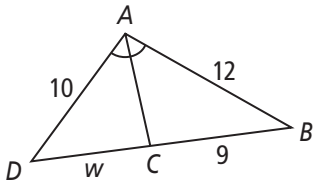


7-5 Game: Proportions Relay

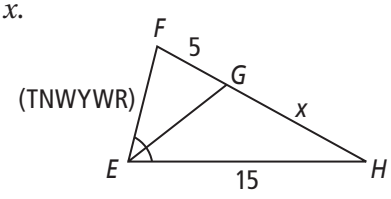
Proportions in Triangles

Photocopy the following sets of relay questions (one copy for each team of four students). Instruct students to sit in rows of four. Cut the questions apart and give A1 to the first student, A2 to the second, and so on.

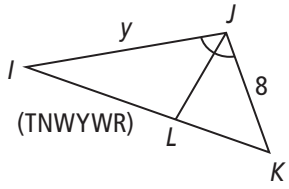
A1. Find w.



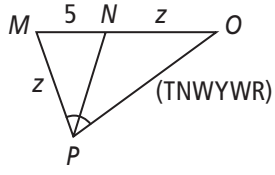
A2. Find x.



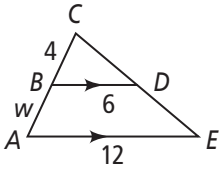
A3. Given that $IK = 16.25$, find y.



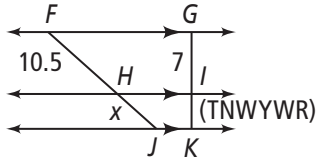
A4. Find z.



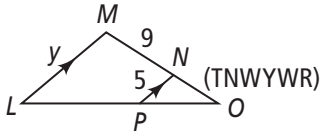
B1. Find w.



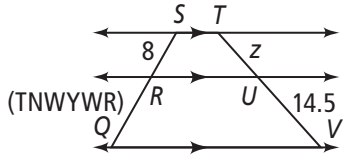
B2. Find x.



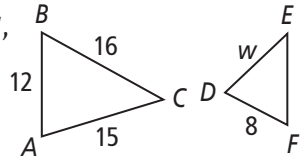
B3. Find y.



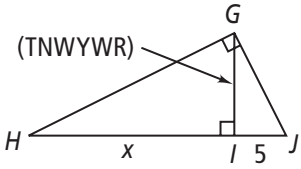
B4. Find z.



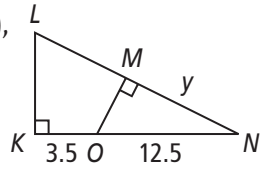
C1. Given that $\triangle ABC \sim \triangle DFE$, find w.



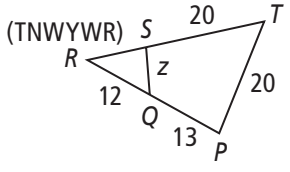
C2. Find x.



C3. Given that $LN =$ (TNWYWR), find y.



C4. Given that $\triangle RSQ \sim \triangle RPT$, find z.



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7-5 Game: Proportions Relay

Proportions in Triangles

Setup

Your teacher will divide the class into teams of four. Sit in a row with your teammates. Each team member will receive a problem on a slip of paper. Leave the problem face down until your teacher instructs you to begin. The first person in your team will have enough information to solve their problem. Subsequent players will have problems that contain a measurement labeled (TNWYWR) for "The Number Which You Will Receive."

Game Play

When your teacher tells you to begin, turn your paper over. The first person on each team completes the problem, writes the *answer only* on the first line of your team's answer slip, and passes the slip to the second person. The second person replaces the (TNWYWR) in his/her problem with the answer from the first person. Then, the second problem can be solved and the answer passed to the third person, and so on. When the fourth person has completed his/her problem, he/she raises the answer slip in the air.

If you pass an answer and then later realize it was incorrect, you may write the corrected answer on a new answer slip and pass it. Then, subsequent players must revise their answers based on the new information. While you wait for the answer from the player(s) before you, set up the problem.

Ending the Game

Each round lasts a maximum of six minutes. When your teacher indicates that time is up, your team must submit its answer slip immediately. Your team earns a point for each correct answer. If your team correctly answers all four problems in under 3 minutes, you earn 2 bonus points. After 3 rounds, the team with the most points wins.

Team: **Round: A**	**Team:** **Round: B**	**Team:** **Round: C**
1. 7.5	1. 4	1. 10
2. 10	2. 6	2. 20
3. 12.8	3. 12.5	3. 10
4. 8	4. 9.28	4. 8
Points earned:	**Points earned:**	**Points earned:**